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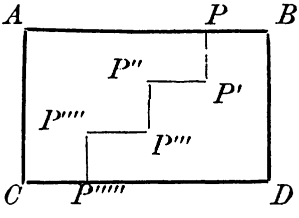
parts that the parts joined together may form a square?

Solution by H. W. DRAUGHON, Clinton, Louisiana.

Let $ABCD$ be the board, and let the broken line $PP'P''P'''P''''P'''''$ be the line of division.



We make $BP=P'P''=P'''P''''=P'''''C=4$ inches, and all parallel to BP; also we make, $PP'=P''P'''=P''''P'''''=3$ inches, and all parallel to BD. From the construction it is obvious that if B be placed at P' and P'''' at C the resulting figure will be 1 foot square.

Solved in a similar manner by *G. B. M. Zerr*, *Robert J. Aley*, and *J. A. Calderhead.*

PROBLEMS.

12. Proposed by CHARLES E. MYERS, Canton, Ohio.

A man made his will to this effect: that if only the daughter returned home his wife should have $\frac{2}{3}$ and the daughter $\frac{1}{3}$ of the estate; and if only the son returned, his wife should have $\frac{1}{3}$ and the son $\frac{2}{3}$. But the son and daughter both returned. How should the estate be divided?

13. Proposed by J. R. BALDWIN, A. M., Professor of Mathematics in the Davenport Business College, Davenport, Iowa.

A man borrowed \$5000 at a western bank giving his note for \$5000 due in 5 years without grace at 8% interest payable annually, and pays the banker a bonus of \$500 in cash for making the loan; what rate per cent. does he pay?

[Solutions to these problems should be received by April 1st.]

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ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

PROBLEMS.

9. Proposed by Professor G. B. M. ZERR, A. M., Principal of Schools, Staunton, Virginia.

$$\left.\begin{array}{l} x+y^2+z^2=21 \\ x^2+y^3+z=45 \\ x^3+y+z^2=71 \end{array}\right\}. \text{ Find } x,\ y, \text{ and } z.$$

10. Proposed by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pennsylvania,

$$\begin{array}{l} x^2+y^2+w^2+z^2=65\ldots.(1), \\ (x+z)^2+(y+w)^2=113\ldots.(2), \\ (y+z)^2+(x+y)^2=117\ldots.(3), \\ (x+y)^2+(z+w)^2=125\ldots.(4).. \end{array}$$

How many values has each of the four unknown quantities?

11. Proposed by ISAAC L. BEVERAGE, Monterey, Virginia.

Two men, A and B, had a money-box, containing \$210, from which each drew a certain sum daily; this sum being fixed for each, but different for the two. After six weeks, the box was empty. Find the sum which each man drew daily from the box: knowing that *A alone* would have emptied it five weeks earlier than *B alone*.

12. **Proposed by F. M. SHIELDS, Coopwood, Mississippi.**

Three lads, *A*, *B*, and *C*, each climbed to the top of an upright pole; *A*'s pole was 20 feet high, *B*'s 60 feet, and *C*'s pole was 100 feet high. They all started at the same time, and each climbed up a part of the way, at the same rate of speed per minute, and after each rested 5 minutes, they ascended to the tops of their respective poles, at the same rate of speed per minute, when they found that each had consumed the same length of time. 25 minutes each, (including the 5 minutes each rested on the way). How far up did each climb before resting? At what rates of speed per minute did they ascend?

13. **Proposed by H C. WHITAKER, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia.**

Six city boys, Jim. Josh, Jerry, Jack, Jake and Jeorje went into the country to steal apples from a tree. While three kept watch, the other three climbed up and got what they wanted. Then they came down while the other three rascals went up and stole. The one that got most was one of the last to go up.

Each trio of theives took the same number and had each boy taken as many as he did take in *each of that number of pockets*, each trio would also have taken the same number and the tree would have lost 538 apples. As it was, Josh got more than Jack, but Jeorje got as many as Josh and Jack together, while Jake got twice as many as Jerry and two more than Jim. What were the names of the three that first kept watch? [Figures altered from problem in *Henkle's Notes and Queries*.]

[Solutions to these problems should be received by April 1st.]

GEOMETRY.

Conducted by B. F. FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

2. Show that $\frac{1}{2}\pi=\left[\frac{2.\ 4.\ 6.\ 8.\ 10}{1.\ 3.\ 5.\ 7.\ 9}\cdots\cdots\right]^2$, *Wallis's* expression for π.

[Selected from *Bowser's Trigonometry.*]

Solution by Professor ZERR. A. M., Principal of School, Staunton, Virginia.

All trigonometries solve the following:

$$\sin\ \theta=\theta\left[1-\frac{\theta^2}{\pi^2}\right]\left[1-\frac{\theta^2}{2^2\pi^2}\right]\left[1-\frac{\theta^2}{3^2\pi^2}\right]\left|1-\frac{\theta^2}{4^2\pi^2}\right|\cdots\cdots$$

Now let $\theta=\frac{\pi}{2}$. Then $1=\frac{\pi}{2}(1-\frac{1}{4})(1-\frac{1}{16})(1-\frac{1}{36})(1-\frac{1}{64})(1-\frac{1}{100})(1-\frac{1}{144})\cdots$

$$=\frac{\pi}{2}\cdot\frac{3}{4}\cdot\frac{15}{16}\cdot\frac{35}{36}\cdot\frac{63}{64}\cdot\frac{99}{100}\cdot\frac{143}{144}\cdots\cdot$$

$$=\frac{\pi}{2}\cdot\frac{3}{2.2}\cdot\frac{3.5}{4.4}\cdot\frac{5.7}{6.6}\cdot\frac{7.9}{8.8}\cdot\frac{9.11}{10.10}\cdot\frac{11.13}{12.12}\cdots\cdot$$

$$=\frac{\pi}{2}\cdot\frac{3^2.5^2.7^2.9^2.11^2}{2^2.4^2.6^2.8^2.10^2}\cdots\cdot$$

$$\therefore\ \frac{\pi}{2}=\left\{\frac{2.4.6.8.10}{1.3.5.7.9.11.}\cdots\cdot\right\}^2$$